

IN THE CLAIMS

Please amend the claims as follows:

Claim 1 (Currently Amended): A method of forming a film, comprising:

~~a coating step of forming a film by~~

~~coating applying~~ a coating liquid[[,]] in which particles or colloids of a starting substance of a film component are dispersed in a solvent[[,]] on [[a]] ~~the~~ surface of a substrate to form a film;

~~a first gelling step of, together with carrying the substrate into a sealed chamber,~~

~~transferring the substrate into a sealed chamber and first gelling the coating liquid on the substrate in a state where while exposing the substrate is exposed to a carrier gas containing [[a]] solvent vapor of the coating liquid at a first average concentration;~~

bringing the substrate to a predetermined temperature, and after the substrate attains a predetermined temperature,

~~a second gelling step of~~

~~secondly gelling the coating liquid on the substrate with in a state where the inside of the sealed chamber is filled by a carrier gas containing the solvent vapor of the coating liquid at a second average concentration higher than the first average concentration;~~

wherein the first average concentration corresponds to the saturated vapor pressure of the solvent at the substrate temperature during transfer into the chamber; and

wherein the second average concentration corresponds to the saturated vapor pressure of the solvent at the substrate temperature at the predetermined temperature during the second gelling.

Claim 2 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1:

wherein [[a]] the temperature of the gas to be introduced in the sealed chamber in the first gelling step is controlled such that temperature thereof so that it is close to that inside the sealed chamber.

Claim 3 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1, further comprising[[:]] preceding prior to the first gelling step, :

~~a step of, together with generating a mixed gas of a vapor of a solvent component and a carrier gas,~~

~~exhausting gas in the treatment chamber while the mixed gas by switching a valve to exhaust side generating a mixed gas of the solvent component vapor and the carrier gas~~

~~wherein in the first gelling an operation of, in the first gelling step, exposing the substrate to the gas containing the solvent vapor of the coating liquid at the first average concentration is carried out by introducing the mixed gas into the sealed chamber by switching the valve.~~

Claim 4 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1[[:]], wherein the first gelling step is a step of comprises heating the substrate.

Claim 5 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1: wherein the gas is generated by mixing a carrier gas and a vapor of a solvent component; and

wherein the first gelling step is carried out by controlling a flow rate of at least one of the carrier gas or the vapor of the solvent component.

Claim 6 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1:

wherein

the mixing of the carrier gas and the vapor of the solvent component is carried out at a vaporizer vaporizing a liquid of the solvent component, and

the first gelling step is carried out by controlling a flow rate of the liquid of the solvent component being introduced into the vaporizer.

Claim 7 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1:  
wherein the first gelling step ~~includes a step of~~ comprises varying continuously [[a]]  
the concentration of the vapor of the solvent component.

Claim 8 (Currently Amended): The method of ~~forming a film as set forth in~~ claim 1:  
wherein the first gelling step ~~includes a step of~~ comprises mixing intermittently the vapor of the solvent component into the carrier gas.

Claim 9 (Currently Amended): The method of ~~forming a film as set forth in~~ of claim 1, further comprising:

~~up to before exposing the substrate to a gas after carrying the substrate into a sealed chamber,~~

feeding [[the]] a gas into a sealed chamber before exposing the substrate to said gas in a state where [[an]] the first average concentration of the vapor of the solvent component is higher than an average concentration during for the first gelling step until the sealed chamber is filled with the gas.

Claims 10-12 (Cancelled)

Claim 13 (Withdrawn): A method of forming a film, comprising:

a step of forming a film by coating, on a surface of a substrate, a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent;

a step of gelling the particles or the colloids in the film; and

a step of dispensing, on the surface of the substrate, at least 2 kinds of replacement solvents different from the solvent by switching them sequentially;

wherein switching of the replacement solvent to be fed is carried out by, after subsequent replacement solvent is began in dispensing while dispensing a preceding replacement solvent, stopping dispensing of the preceding replacement solvent.

Claim 14-15 (Cancelled)

Claim 16 (Withdrawn): The method of forming a film as set forth in claim 13:

wherein the step of dispensing by switching sequentially the replacement solvent is a step of dispensing on the substrate an alcohol, a hydrophobic treatment liquid, and a solvent of smaller surface tension than solvents included in the coating liquid in this order.

Claims 17-18 (Cancelled)

Claim 19 (Withdrawn): A method of forming a film, comprising:

a step of forming a film on a surface of a substrate by coating a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent under an atmosphere that is filled by a vapor of the solvent; and

a step of gelling the particles or colloids in the film.

Claim 20 (Withdrawn): A method of forming a film, comprising:

- a step of carrying in a substrate from an intake into a treatment chamber;
- a step of closing the intake of the treatment chamber;
- a step of filling the treatment chamber by a solvent vapor;
- a step of coating, on a surface of the substrate, a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in the solvent in the treatment chamber filled by the vapor; and
- a step of gelling the particles or colloids in the film.

Claim 21 (Withdrawn): The method of forming a film as set forth in claim 20, further comprising:

- a step of removing, after the film is spread on the surface of the substrate, while the treatment chamber is being filled by the vapor of the solvent, the film on a circumference portion of the substrate by dispensing a cleaning liquid for removing the film on the circumference portion of the substrate.

Claim 22 (Withdrawn): A method of forming a film, comprising:

- a step of carrying in a substrate into a treatment chamber from an intake and placing it on a rotary stage; a step of closing the substrate intake of the treatment chamber;
- a step of filling a vapor of a solvent into the treatment chamber to fill by the vapor;
- a step of, together with rotating the rotary stage, dispensing, on a surface of the substrate, a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in the solvent to spread the coating liquid on the surface of the substrate; and

a step of gelling the particles or colloids in the film.

Claim 23 (Withdrawn): The method of forming a film as set forth in claim 22, further comprising:

a step of, after spreading the film on the surface of the substrate, while the inside of the treatment chamber is being filled by the solvent vapor, dispensing a cleaning liquid for removing the film on a circumference portion of the substrate to remove the film on the circumference portion.

Claims 24-25 (Cancelled)

Claim 26 (Withdrawn): A method of forming a film, comprising:

a step of coating, on a surface of a substrate, a solvent which is of lower viscosity than that of the most viscous solvent component of a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent, and which dissolves the starting substance;

a step of forming a film by coating the coating liquid on the surface of the substrate;  
and

a step of gelling the particles or colloids in the film.

Claim 27 (Withdrawn): The method of forming a film as set forth in claim 26:

wherein a solution of lower viscosity than the most viscous component among the solvent components is one solvent component of the coating liquid.

Claim 28 (Withdrawn): The method of forming a film as set forth in claim 26:

wherein the solution of lower viscosity than that of the most viscous solvent component is an alcohol.

Claim 29 (Withdrawn): The method of forming a film as set forth in claim 26, further comprising:

a solvent replacement step of dispensing a solvent different from the solvent on the surface of the substrate thereon the film is formed and gelling treatment is carried out, and of replacing the solvent in the film by the different solvent.

Claims 30-31 (Cancelled)

Claim 32 (Withdrawn): A method of forming a film, comprising:

a step of mixing a first liquid containing particles or colloids of a starting substance of a film component which is insoluble or difficult to be dissolved in water, and water, and a second liquid consisting of an organic solvent in which water and film component dissolve;

a step of, before elapse of film quality deteriorating time after completion of mixing, coating a mixed liquid containing the first liquid and the second liquid on a surface of a substrate; and

a step of gelling the particles or colloids in the film coated on the substrate.

Claim 33 (Withdrawn): The method of forming a film as set forth in claim 32:

wherein the film quality deterioration time is 6 min. after completion of mixing.

Claim 34 (Withdrawn): A method of forming a film, comprising:

a step of mixing a first liquid containing particles or colloids of a starting substance of a film component which is insoluble or difficult to be dissolved in water, and water, and a second liquid consisting of an organic solvent in which water and the film component dissolve;

a step of, before elapse of film quality deteriorating time which deteriorates quality of the film obtained by mixing thereof after completion of mixing, coating a mixed liquid containing the first liquid and the second liquid on a surface of a substrate;

a step of cleaning an inside of a flow path of the mixing portion and a downstream side thereof by an organic solvent; and

a step of gelling the particles or colloids in the film coated on the substrate.

Claim 35 (Currently Amended): The method of forming a film as set forth in claim 34:

wherein the film quality deterioration time is 6 min[.] after completion of mixing.

Claim 36 (Withdrawn): A method of forming a film, comprising:

a step of forming a film by coating a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent on a surface of a substrate;

and

a step of gelling the particles or colloids in the film by exposing the substrate to an ammonia gas;

wherein, in the gelling step, an ammonia gas is sequentially introduced into at least 2 baths accommodating ammonia water of an ammonia concentration lower than a saturated concentration to generate an ammonia gas, the ammonia gas generated in advance is fed to

the substrate, thereafter the ammonia gas generated subsequently is fed to the substrate, thereby conductance of the ammonia gas fed to the substrate is kept constant.

Claim 37 (Withdrawn): A method of forming a film, comprising:

a step of forming a film by coating a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent on a surface of a substrate; and

a step of gelling the particles or colloids in the film by exposing the substrate to an ammonia gas;

wherein the gelling step comprises:

a step of carrying in a substance to be treated into a treatment chamber;

a first treatment step of generating the ammonia gas containing water vapor by bubbling the ammonia gas into a first bath reserving ammonia water of an ammonia concentration lower than a saturated concentration and of feeding the ammonia gas into the treatment chamber;

a step of generating the ammonia gas containing water vapor by bubbling an inside of a second bath reserving ammonia water of an ammonia concentration lower than a saturated concentration by the ammonia gas, and of exhausting the ammonia gas without through the treatment chamber;

a second treatment step of switching a gas flow path from the first bath to the treatment chamber to a gas flow path from the second bath to the treatment chamber, and feeding the ammonia gas generated from the second bath into the treatment chamber; and

a step of replenishing the ammonia water into the treatment chamber.

Claim 38 (Withdrawn): The method of forming a film as set forth in claim 37:

wherein the gelling step is a step in which conductance of a flow path when a gas flows through a treatment chamber from a first bath, conductance of a flow path when a gas flows through a first exhaust path from a first bath, conductance of a flow path when a gas flows through a treatment chamber from a second bath, and conductance of a flow path when a gas flows through a second exhaust path from a second bath are made equal.

Claim 39 (Withdrawn): A method of forming a film, comprising:

a step of forming a film by coating a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent on a surface of a substrate; and

a step of gelling the particles or colloids in the film by exposing the substrate to an ammonia gas;

wherein the gelling step comprises:

a step of, by generating an ammonia gas containing water vapor by bubbling an inside of a first bath where ammonia water of a lower ammonia concentration than a saturated concentration is reserved by the ammonia gas, exhausting the ammonia gas without through a treatment chamber but through a first exhaust path;

a step of carrying in the substance to be treated into the treatment chamber;

a first treatment step of, by switching subsequently a flow path of the ammonia gas generated from the first bath from the first exhaust path to the treatment chamber, feeding the ammonia gas into the treatment chamber;

a step of, during the first treatment being carried out, by generating the ammonia gas containing water vapor by bubbling the second bath where ammonia water of an ammonia concentration lower than a saturated concentration is reserved by the ammonia gas,

exhausting the ammonia gas without through the treatment chamber but through the second exhaust path;

    a step of, together with switching a gas flow path from the first bath to the treatment chamber to a gas flow path from the second bath to the treatment chamber, by closing the second exhaust path, feeding the ammonia gas generated from the second bath into the treatment chamber; and

    a step of replenishing the ammonia water into the first bath.

Claim 40 (Withdrawn): The method of forming a film as set forth in claim 39:

    wherein, in the gelling step, conductance of a flow path when a gas flows from a first bath through a treatment chamber, conductance of a flow path when a gas flows from a first bath through a first exhaust path, conductance of a flow path when a gas flows from a second bath through a treatment chamber, and conductance of a flow path when a gas flows from a second bath through a second exhaust path, are made equal.

Claim 41 (Withdrawn): A method of forming a film, comprising:

    a step of forming a film by coating, on a surface of a substrate, a coating liquid in which particles or colloids of a starting substance of a film component are dispersed in a solvent; and

    a step of gelling the particles or colloids in the film by exposing the substrate to an ammonia gas;

    wherein the gelling step comprises:

        a preparatory, exhaust step of exhausting a treatment gas from a gas generating source without through a treatment chamber but through an exhaust path;

        a step of carrying in an object to be treated into a treatment chamber; and

a step of, by switching a flow path from the exhaust path to the treatment chamber side, treating the object to be treated by feeding the treatment gas from the gas generating source into the treatment chamber;

wherein conductance of a flow path from the gas generating source through the treatment chamber and conductance of a flow path through the exhaust path, are made equal.

Claim 42-47 (Cancelled)

Claim 48 (New): The method of Claim 1, wherein the coating liquid comprises colloids or particles of a metal alkoxide.

Claim 49 (New): The method of Claim 1, wherein the coating liquid comprises dispersed colloids of TEOS (tetra-ethoxy-silane).

Claim 50 (New): The method of Claim 1, wherein the solvent comprises ethylene glycol or ethyl alcohol.